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A Century of Research

By Jonathan Knutson, AGWeek

MANDAN, N.D. — There's a patch of prairie pasture south of Mandan, N.D., on which the native grasses have been undisturbed, except by grazing cattle, since 1916.

For 96 years — through a gauntlet of extreme weather conditions — federal researchers have studied the pasture to see how many cattle it can accommodate without overgrazing.

John Hendrickson, a rangeland scientist, is one of the pasture's current stewards. On a warm, windy day in late June, he looks over the pasture's ankle-high grass and says, "We want a range and forage system that makes economic sense for producers and that also provides agricultural stability."

That approach is the hallmark of the Northern Great Plains Research Laboratory, which is celebrating its 100th anniversary this summer.

1 Rangeland scientist John Hendrickson is part of a long tradition at the NGPRL in Mandan, N.D. The pasture in which he is standing has been studied by USDA scientists since 1916. The lab is celebrating its 100th anniversary this summer.

The lab, part of the U.S. Department of Agriculture's Agricultural Research Service, continues to search for ways to enhance and sustain agriculture in the Upper Midwest.

"We've always been about soils, sustainability and the survivability of family farms," says Cal Thorson, the lab's technical information specialist.

Today, the lab works on everything from crop diversity

and cover crop practices to biofuels and the benefits of feeding flaxseed to beef cattle.

Most of the lab's work involves the Upper Great Plains, primarily North Dakota, South Dakota, Minnesota and eastern Montana.

The Agricultural Research Service, USDA's main in-house research arm, has more than 100 locations across the country.

Employees, perceptions

The Mandan lab has 33 year-round employees, including eight scientists, and about a dozen seasonal employees.

2 Matt Sanderson is laboratory director and research leader at the U.S. Department of Agriculture's Northern Great Plains Research Laboratory in Mandan, N.D. Agweek photo by John Brose

The lab's base funding comes from USDA, and the lab's scientists also compete with scientists elsewhere for USDA grants.

Matt Sanderson, a native of Willow City, N.D., has led the Mandan lab since 2010. He has a doctorate in crop production and physiology from Iowa State University. Before coming to Mandan, he conducted research at Texas A&M University and for the Agricultural Research Service in University Park, Penn.

Sanderson also works as a full-time scientist. His background is in forage grassland management, and he's collaborating with several scientists at the Mandan lab on research into rangeland management and forage management.

Many people in the Bismarck-Mandan area (Bismarck, N.D.'s capital, is separated from Mandan by the Missouri River) have little, if any, understanding of what the Mandan lab does, Sanderson and others at the lab say.

"But we want to be good neighbors. Visitors are always welcome," Sanderson says.

Past achievements

The lab, in its early days, focused on research to help homesteaders: raising vegetables for human consumption and planting trees to protect homesteads and livestock were two important areas of research.

By the early 1960s, the lab had introduced many new apple, apricot, plum, crabapple, tomato and sweet corn cultivars to the public.

The lab's research has shifted to meet the evolving needs of area agriculture.

A few examples: irrigation research began in the 1950s; research into reclaiming open-pit mined lands for crop production began in the 1970s; conservation tillage research was a priority in the 1980s.

In 1984, the lab launched the 400-acre Cooperative Research Farm in conjunction with the Area IV Soil Conservation District, which consists of the soil conservation districts in 11 North Dakota counties.

The Cooperative Research Farm, about three miles from the Mandan lab, continues to operate. It conducts research into conservation tillage and cropping systems on farmer-sized fields rather than small test plots.

The Mandan lab controls about 2,400 acres, land that it either owns or rents.

Present priorities

Today, the lab is involved in a wide range of research. Here's a sampling of what's going on:

• Kristine Nichols, a research soil microbiologist, is engaged in research on glomalin, fungi that help plants acquire nutrients.

Her work has found, among other things, that farmers can increase glomalin by planting cover crops to maintain living roots.

• Hendrickson is involved in a five-year project to control Kentucky bluegrass, which is increasingly common in pastures across the region.

While cattle eat Kentucky bluegrass, the plant limits growth of native grasses. That can reduce forage production in mid- and late summer.

• Rebecca Phillips, a plant physiologist, is working on remote agricultural sensing. The research can help ranchers determine how many cattle can graze a pasture given changing weather conditions.

• Scott Kronberg, a research animal scientist, is working to improve the nutritional quality of red meat.

• Dave Archer, agricultural research scientist, has looked at the use of oilseed crops for "green" jet fuels in the military.

A key focus is on what's known as "dynamic cropping systems," Sanderson says.

With the help of the lab's research, "Farmers are able to adjust their cropping systems, their crop rotation choices, not necessarily at the last minute, but to give themselves much more flexibility," he says.

Farmers already use their experience to make such choices, but dynamic cropping systems will make the process more scientific, Sanderson says.

Dynamic cropping systems also include cover crops and putting animals on the land.

“It seems to be a pretty good thing for a lot of producers around here. There’s a lot of interest in it,” Sanderson says.

On the road ahead

Biofuels, sustainability and so-called “integrated agriculture’ — which combines crop and livestock production — likely will remain cornerstones of the Mandan lab’s research in coming years, he says.

Earlier this year, the lab was named one of 10 ARS long-term Agro-Ecosystem Research sites nationwide.

The 10 sites are focused on looking at “agriculture at a much larger scale,” Sanderson says.

The idea is designing research for 50 to 100 years that involve large areas such as watersheds, he says.

“What we’re focusing on is, what are the things we need to measure now that still will be relevant 50 to 100 years down the road? Things such as productivity, soil baseline measurements,” he says.

The lab’s budget was cut by roughly $500,000 last year. As a result, two vacant scientist positions and two vacant technical positions were eliminated.

Sanderson is optimistic that the lab’s current annual budget of $3.4 million won’t be cut.

Focus on the ‘customer’

The Mandan lab’s research is intended to fit the evolving needs of area agriculture, Sanderson says.

A customer focus group of about 60 members helps the Mandan lab determine what direction its research should take.

“We get that group together twice a year and we talk to them about our research and research results. We get feedback from them on our research. Sometimes they say, ‘That’s great stuff.’ Sometimes they say, ‘Why on Earth are you working on that?’” Sanderson says.

“And we ask them, ‘What are your needs? What type of research would benefit you?’ And they give us a lot of input. Some things we can do, some things we can’t,” he says.

LeAnn Harner, director of the Area IV Soil Conservation District, is a member of the Mandan lab’s customer focus group.

She says the lab listens carefully to the focus group and takes its input seriously.

Sirens, humor and tragedy

Albert Frank, a retired plant physiologist at the Mandan lab, wrote “The Taming of the Prairie: A Century of Agricultural Research at Northern Great Plains Research Laboratory.”

Among the information he uncovered:

• For many years at the lab, sirens rang four times daily: at 8 a.m. to start the work day, at noon to signal lunchtime, at 1 p.m. to call staffers back to work and at 5 p.m. to end the work day.

• In the lab’s early years, scientists in Mandan became suspicious that USDA officials in faraway Washington, D.C., weren’t reviewing the North Dakota research before publishing it in USDA bulletins. So one Mandan scientist prepared a preliminary bulletin stating that jackrabbit damage to fruit trees could be controlled by flying kites over orchards at night. The claim was nonsense, but the USDA officials in Washington published the bulletin anyway. The Mandan scientist, having proved his point, destroyed the faulty bulletins.

• Tragedy has struck the lab four times through the years. In 1915, a seasonal worker was killed while pulling trees to clear land. In the mid-1930s, a worker was killed when he was hit in the head by an engine crank. In 1952, two people drowned in the rain-swelled Heart River. In 1991, a seasonal worker was killed in a tractor rollover.

Frank, who lives in Bismarck, tells Agweek that he volunteered to write the history.

He worked at the Mandan lab from 1969 to 2004. When he started, he worked with, and learned from, some outstanding scientists who had been at the facility for many years, he says.

In 1996, there were plans to close the Mandan lab because of funding problems. Frank thought he would be transferred to Fargo, N.D., and even looked for housing there.

“That was a tough time on everybody,” he says.

Ultimately, pressure from farmers and others led Congress to provide enough funding for the Mandan lab to remain open.

3 John Hendrickson, rangeland scientist at the Northern Great Plains Research Laboratory, examines grass in a pasture that has been studied by federal scientists for 96 years. Agweek photo by John Brose.

‘100 lifetimes’ of work

Mark Liebig, a soil scientist at the Mandan lab, likes to tell people that’s he’s “working on national security.”

He smiles and says, “If you tell them that you work with soils, you can see them go to sleep. But you get their attention when you say ‘national security.’ And, really, when you think about it, healthy soils are part of our national security.”

He and other scientists build on what previous generations of scientists have learned. Likewise, scientists of the future will build on what Liebig and other scientists are learning today, he says.

“You figure out one piece of the puzzle and then the attention shifts to another piece,” he says.

A century of research at the Mandan lab has just scratched the surface, he says.

“There’s still enough work here for 100 lifetimes,” he says.